Two Cases with Delayed Rupture of Flexor Pollicis Longus After Anatomical Volar Plating for Distal Radius Fractures in Japan

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Abstract

We underwent two orthopaedical surgery cases with delayed rupture of flexor pollicis longus after anatomical new volar locking plating for distal radius fractures in Japan. Case 1: 65 and case 2: 68-year-old females. Both cases right-handed housewife sustained by a fall in her house followed by her right distal radius fracture with dorsal displacement. Open reduction and internal fixation was performed using small size new Japanese anatomical volar distal locking plate for distal radius fracture. Case 1: six months after and case 2: four months after surgery, they had a sudden thumb flexion limitation during pinch movement and no associated pain. We performed debridement the ruptured margin of flexor pollicis longus, and removed the plate. Refreshed distal end of flexor pollicis longus and palmaris longus tendon was sutured interlacing method. Both received thumb spica cast for 3 weeks and then began passive-motion exercises. Their thumb movement and functions were recovered to normal activities of daily living at 3 months after suture surgery. Although anatomical volar distal locking plate are made for fitness to Japanese distal radius, they do not place over the distal part of the transverse ridge.

Keyword: Distal Radius Fracture; Volar Distal Radius Locking Fixation; Delayed Rupture of Lexor Pollicis Longus

Abbreviations

VLP: Volar Distal Locking Plate; DASH: Disabilities of the Arm, Shoulder and Hand; FPL: Flexor Pollicis Longus; ADL: Activities of Daily Living

Introduction

Osteoporotic distal radius fractures in elder age are common all over the world. Traditionally, distal radius fracture in elder patients were treated with closed reduction and cast immobilization [1]. Dorsal distal plate fixation method causes various complications such as extensor tendon ruptures, metal breakages and complex regional pain syndrome [2]. In contrast, volar distal radius locking plate (VLP: many types are currently on the world market) significantly reduces these complications and offers any functional advantage (better Disabilities of the Arm, Shoulder and Hand [DASH] scores and rehabilitation, lower infection rate and so on) earlier in recovery against these operation methods for closed reduction, percutaneous pinning and external fixation [3-5]. Delayed rupture of flexor pollicis longus (FPL) after VLP were reported in several types of VLP [6-8]. In 2015, new type VLP (GlobalForm: Nexmed international, OrthoSurgical Inc. USA) fixation system is developed by Japanese orthopedics and American engineers. The plates are anatomical arranged shape to fit

the topography of Japanese distal radius. To aid in capture of specific fragments including radial styloid process, cannulated screws are adopted for VLP for the first in Japan. The unique variable locking technology allows locking screws to be angled anywhere a 30 degrees cone around the central axis of plate hole [9]. In GlobalForm VLP fixation method at our Kindai associated hospitals, two Japanese female cases of rupture of FPL were associated with a prominent distal volar lip of this plate and located on the distal part of the transverse ridge.

In 2015 - 2016, we performed the GlobalForm VLP (total: 129 cases in our hospitals) for intra-articular comminuted unstable type distal radius fracture in our hospitals. We further applied mainly conservative cast for stable type of radius after manual correction. Sometimes pin (Kirschner) fixation and external fixation for other types of the fracture.

Case Reports

65-year-old right-handed housewife (155 cm, 62 kg, Body Mass Index: BMI = 25.8, with thyroid and parathyroid hormone therapy) sustained by a fall in her house followed by her right intra-articular comminuted distal radius and ulnar styloid fractures with dorsal displacement (Figure 1) on 9th June 2015. Open reduction and internal fixation was performed using small type GlobalForm VLP for distal radius fracture at 3 days after the trauma, and the plate was covered by the pronator quadratus after fixation (Figure 2). Postoperative radiographic finding revealed acceptable restoration of radius correction except the plate located on the distal part of the transverse ridge for less degree of cannulated locking screws to spread radius distal end. She visited our hospital every month for treatment of complicated disease. Six months after surgery, she had a sudden thumb flexion limitation during pinch movement with no associated pain. We diagnosed her FPL tendon rupture using ultra-sonographic findings. We performed debridement the ruptured margin of FPL, removed the plate (Figure 3). Refreshed distal end of FPL and palmaris longus tendon was sutured interlacing method. She received thumb spica cast for 3 weeks and then began passive-motion exercises. Her thumb movement and functions were recovered to normal activities of daily living (ADL) at 3 months after suture surgery.
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**Figure 2:** Case 1: post-operative radiographic status before FPL rupture. VLP located over the distal part of the transverse ridge.

**Figure 3:** FLP rupture status after removal VLP for radius on operation. Arrow1: distal FPL and arrow 2: proximal FPL were lacerated and ruptured on VLP. Round indicated distal screws area.
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68-year-old right-handed housewife (145 cm, 53 kg, BMI = 25.2, with hypertension and aneurysm of aorta) sustained by a fall in her house step followed by her right intra-articular comminuted distal radius (free fragments on dorsal radius end) and ulnar styloid fractures with dorsal displacement (Figure 4) on 13th February 2016. Open reduction and internal fixation was performed using small type GlobalForm VLP for distal radius fracture at 2 days after the trauma, and plate was covered by the pronator quadratus muscle after fixation (Figure 5). She received forearm to palm casting two weeks after operation for rest and protect to covering pronator quadratus muscle. Postoperative radiographic finding revealed acceptable restoration of radius correction except the plate located on the distal part of the transverse ridge and 2 mm step-off of the radius distal end. Free fragments of dorsal radius end were not fixed in this system. Four months after surgery, she had a sudden thumb flexion limitation during pinch movement with no associated pain. We diagnosed her FPL tendon rupture using ultra-sonographic findings. We performed debridement the ruptured margin of FPL, removed the plate. Refreshed distal end of FPL and palmaris longus tendon was sutured interlacing method. She received thumb spica cast for 3 weeks and then began passive-motion exercises. Her thumb movement and functions were recovered to normal ADL at 3 months after suture surgery.

Figure 4: 68 years old right handed housewife. Intra-articular comminuted distal radius and ulnar styloid fractures. Pre-operative and no correct radiological status. Free fragments on dorsal radius end.

Discussion

Neurologically, the function of these fingers to hands and upper limbs are occupied the wide area in the brain motor cortex, older patients recommended the solid fixed VLP without casting for the upper limb functional improvement evaluation by DASH score [10]. The VLP fixation had better grip strength through the entire time period, achieving an almost anatomical reconstruction did not convey any improved range of motion or better ADL and quality of life [11]. There was no difference between the subjective and functional outcomes for the VLP and the non-surgical treatments in a cohort study of patients older than 70 years [12]. FPL rupture after volar plating are rare, and open reduction and VLP fixation is a good option for the unstable type of radius fractures [13]. The transverse ridge or watershed line of the distal radius imported to prevent a flexor tendon injury [14]. VLP placed distal to the transverse ridge have to impinge on the traversing flexor tendons [15]. In case of the VLP is located near and over the transverse ridge after surgery, it is necessary to make careful observations to prevent FPL [11,12]. There are no symptoms of FPL in our two cases after operation but plates were placed distal radius and over palmar inclination to radius end. We must be removing these VLP as soon as possible after bony union achieved if these patients complained. The anatomical GlobalForm VLP is said to be produced for fitness to Japanese distal radius, and do not place over the distal part of the transverse ridge. However, the size and shape are not perfectly fit to Japanese radial anatomical curve. Therefore, the other idea due to the plane distal radial part of the GlobalForm will be necessary in future completely correct and fit to Japanese radial anatomical curve.

Conclusion

We underwent two orthopaedical surgery cases with delayed rupture of flexor pollicis longus after anatomical new volar locking plating for distal radius fractures in Japan. The anatomical GlobalForm VLP is said to be produced for fitness to Japanese distal radius, and do not place over the distal part of the transverse ridge.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Bibliography


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